CLAIMS

1- Pulsed-plasma ion-nitriding process characterized by positioning the sample (1) that is the cathode itself, in the interior of a nitriding chamber (2), whose internal wall is the anode (3), wherein vacuum is made by means of a vacuum pump (4) until the pressure gauge (5) reads a pressure of, for example, equal to 30 mTorr (3.99 x 10^{-6} MPa), in which chamber a gas inlet (6) is used to introduce a nitrogen rich gaseous mixture with composition varying in the range N_2 + 0%-50% H_2, choosing a work pressure of, for example, about 4 Torr (5.33 x 10^{-4} MPa), and applying a difference of potential (7) that corresponds to a temperature of up to 400 °C measured by means of a thermocouple (8), such that the nitriding times are calculated from the sum of the periods of time that the plasma was active, so as to keep this total time a fixed value, and after finishing the nitriding treatment the samples are cooled within the nitriding chamber under a nitrogen atmosphere.

2- "Pulsed-Plasma Ion-Nitriding Process" in accordance with reinvindication 1, characterized to be a method to obtain a diffusion barrier for hydrogen in steel.

3- "Pulsed-Plasma Ion-Nitriding Process" in accordance with reinvindication 1, characterized to be performed in steel using an extended range of temperatures, from room temperature to 400 °C, preferentially in temperatures between 300 and 400 °C.

4- "Pulsed-Plasma Ion-Nitriding Process" in accordance with reinvindication 1, by making use of a gaseous mixture preferentially for the example disclosed in the range

N_2 + 0% - 20% H_2.

5- "Pulsed-Plasma Ion-Nitriding Process" in accordance with reinvindication 1, characterized by calculating the nitriding times from the summation of the times in which the plasma was active, in order to keep this total time at a fixed value.

6- "Pulsed-Plasma Ion-Nitriding Process" in accordance with reinvindication 1, characterized by measuring the hydrogen permeability in the pulsed-plasma ion-nitrided steel hundreds of times smaller than the hydrogen permeability in the substrate steel.